

REMARKS/ARGUMENTS

The Examiner's attention is respectfully directed to paragraph numeral 0013 of the instant application which describes a prior art method of depositing a film or seed layer over an under bump metallurgy of a semiconductor wafer. The semiconductor wafer is placed in a wafer jig having an opening therein exposing an upper surface of the semiconductor wafer. The jig is dipped in a plating solution so that the entire wafer is submerged below the plating solution. However due to the small width of the opening in the photoresist layer overlying the under bump metallurgy and the aspect ratio, it is difficult to completely plate the entire surface of the under bump metallurgy exposed by the opening in the photoresist layer. This is the problem that the present inventors were facing.

Applicant's solution to the problem includes the instant invention involving an apparatus, and a method performed using the apparatus. The Examiner's attention is respectfully directed to paragraph 0047 of the instant application. Applicant's solution includes utilizing the apparatus of the instant claims to pretreat a semiconductor wafer with a wetting solution discharged by the spray nozzles of the apparatus. After the pretreatment, a semiconductor jig having the semiconductor wafer therein is dipped in an electroplating solution so that, for example, a first seed layer may be plated over the under bump metallurgy. Using the present invention apparatus and method, the first seed layer extends to the sides 68 of the photoresist that define the opening 26 to completely cover the exposed surface of the under bump metallurgy 18 without any voids as shown in Figure 7.

None of the references relied on by the Examiner recognize the problem that the inventor was facing. None of the references of record recognize the claimed apparatus as a solution to the problem the inventors were facing. No prima facie case of obviousness can be established using the references relied on by the Examiner.

Claims 21-26 were rejected under 35 USC 103 (a) as being unpatentable over Abe et al in view of Kanno, US Pat. No. 5,935,566.

Abe et al. '392 discloses an automatic photomask or reticle washing and cleaning system wherein a photomask is moved past a plurality of nozzles which spray a cleaning solution such as ammonia water (see column 9, lines 24-35). Abe et al. is not directed to solving the problem of making an apparatus sufficient to pretreat a semiconductor substrate with an opening in a photoresist mask in a manner to allow the semiconductor substrate to be plated through the opening in the photoresist mask. Abe et al in not even directed to cleaning a semiconductor wafer. The jig shown in Fig. 13 of Abe et al is designed to hold a square reticle and could not be used to hold a semiconductor wafer. A person skilled in the art would not look to Abe et al for solutions to making an apparatus for pretreating a semiconductor wafer prior to electroplating. No prima facie case of obviousness can be established over Abe et al. individually or in combination with any of the other references of record.

Kanno is directed to a method of power washing a semiconductor wafer to remove debris. The Kanno apparatus directs a concentrated spray of water onto a narrow area of the wafer and

the wafer is rotated so that a larger area of the wafer may be cleaned. In contrast, Abe et al does not rotate the reticle, but fans the spray out to cover the surface of the reticle (see col. 8, line 35-60). Further, the Abe et al apparatus is designed to prevent splash (see col. 8, line 62 to col. 9, line 5). A person skilled in the art would not be motivated to modify Abe et al by substituting the sprayer of Kanno for the spray of Abe et al because to do so would not result the entire surface of the reticle being cleaned by the concentrated sprayer of Kanno because the Abe apparatus does not rotate the reticle. Further, the concentrated sprayer of Kanno would result in unwanted splash, an undesirable result according to Abe et al.. Because advantages and function of Abe would be lost, a person of ordinary skill in the art would not be motivated to make the modification proposed in the rejection. No prima facie case of obviousness can be established based on the references relied on.

Applicants have amended claim 21 to give life to the preamble and so that the claimed apparatus functions in a manner different from Abe et al and Kanno.

None of the references relied on suggested the combination recited in newly added claims 29-31.

Should any fee be due as a result of this amendment, the Commissioner is hereby authorized to charge Deposit Account No. 50-0484 any such fee.

In view of the above amendments and remarks, Applicant respectfully requests  
reconsideration and allowance of all the claims now in the case.

Respectfully submitted,

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